XFEL operation statistics

Hands on and some background

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Outline

How it started

- From the initial idee, to …
- the early days at FLASH

Some technical background

- The TTFelog
- XSLT and such ugly stuff

The modern days

- From first elogbook based statistics at FLASH to
- these days statistics at XFEL
- Operators: *Now it's your job*

What it's used for

- Reports and the Statistics Dashboard
- Live presentation

What's missing

- Other statistics
- Shortcomings and a look to the future

**Questions?**

How it started

The very early days

- Already for the Tesla Test Facility TTF there was the attempt to follow performance parameters, like:

    - Downtimes of "NEW" Tesla type cavities, but also

    - other devices

- For tracking **cavity performance** already in the first days of TTF a Oracle based database (DB) has been set up: the *cavity DB*

- UI interface has been an **Oracle based forms** application

- That days **all shift accounting** has been done using this Oracle forms, but this was simply getting very clumsy

Some technical background

Data flow for the TTF Logbook

The TTFelog

- In 2001 the TTF electronic logbook was born

- Idee to more easy and better document actions taken on the facility

- Paper based logbooks where hard to maintain and there was strong increase in electronic based controls (remember that days TTF has been operated from Hall 3 extension, with oscilloscopes, …)

- Build on the idea of using a **printer queue** to push content to some service and a **web browser** to view this content together with the **new XML** technology
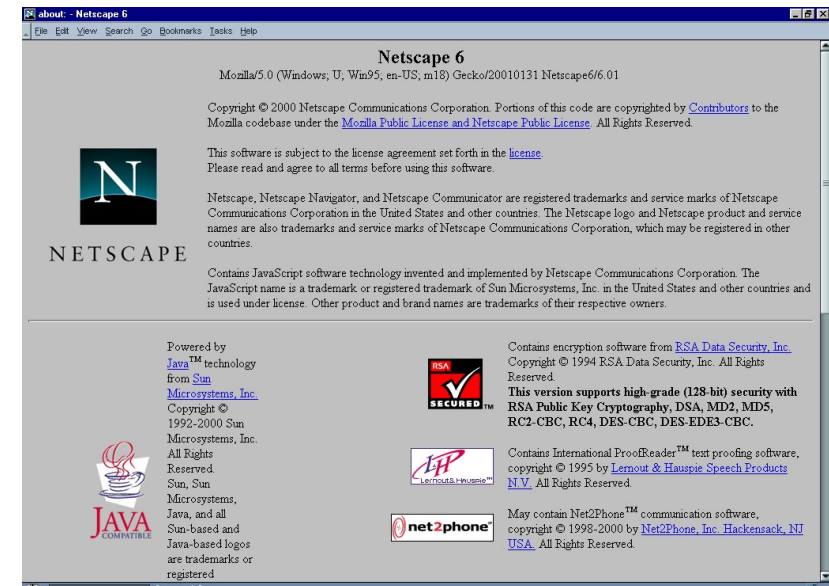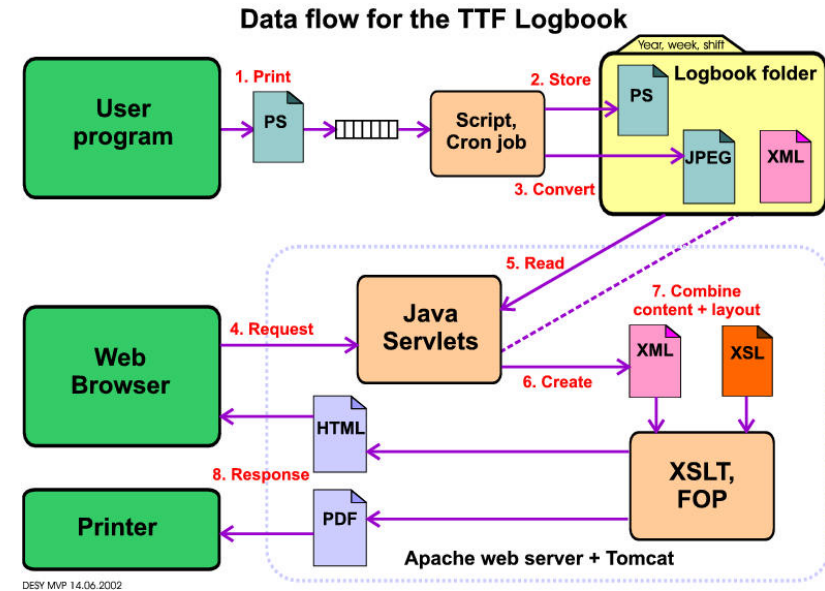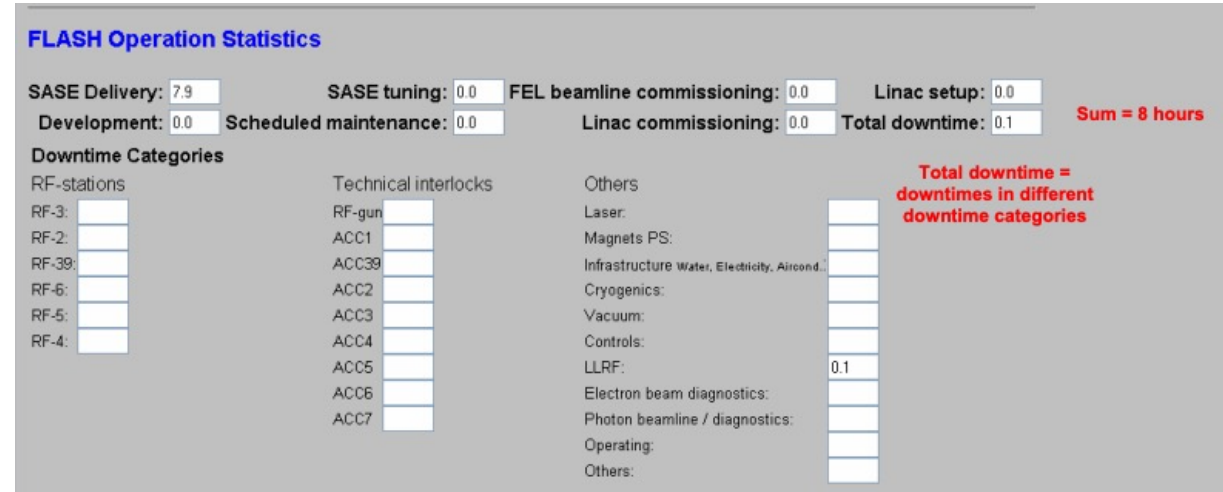
The modern days

From first elogbook based statistics at FLASH to

The initial idea

- In general an logbook is meant for *logging* events, or actions

- First ideas to do so using **jddd buttons** to fire commands to elogbook system to **create** a **timestamped event entry**

- In cooperation with K. Honkavaara and B. Faatz we developed the **first panels and the backend** for this approach in - hm was it **2011**, or …
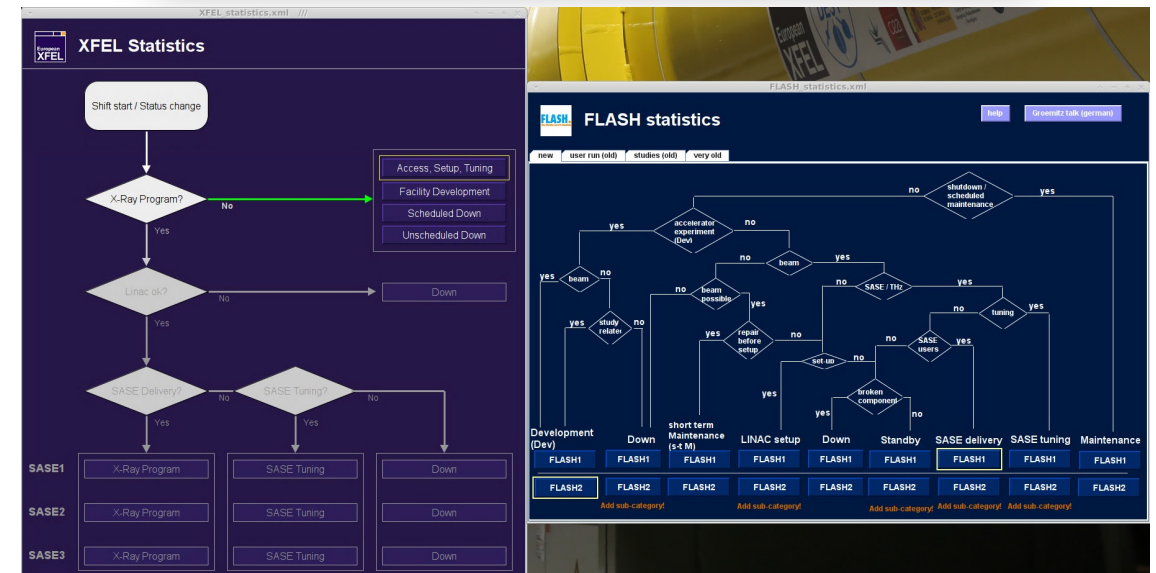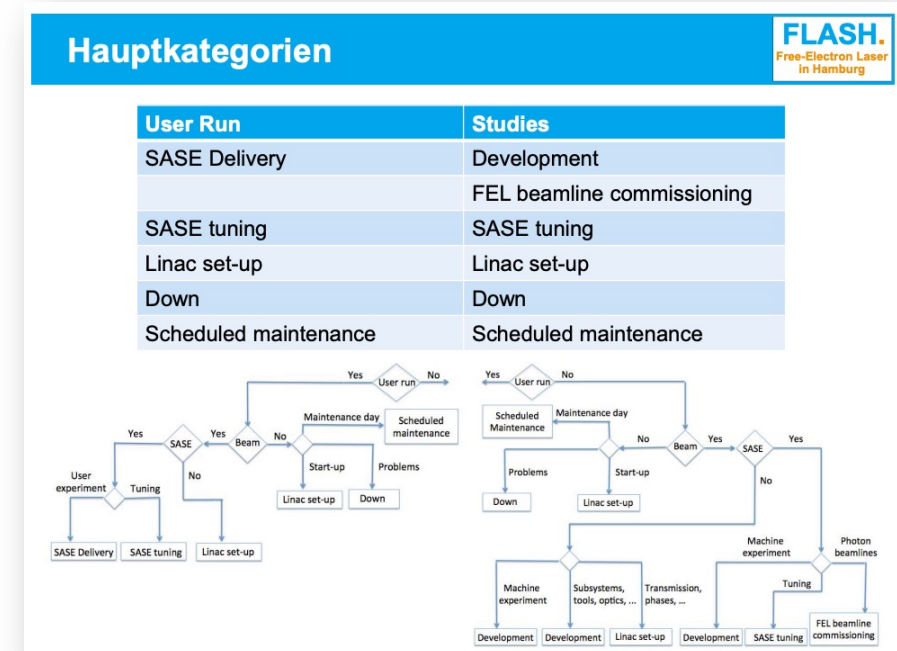
The modern days

these days statistics at XFEL

FLASH and XFEL are technically identical!

- Underlaying **technique** for both is **still the same**

- Much **more categories** exist at FLASH

- K. Honkavaara and J. Rönsch-Schulenburg set up lots of documentation on how to select categories

- With XFEL entering x-ray delivery Winni and me **consolidated** these and reduced the **categorization** dramatically

The modern days

these days statistics at XFEL
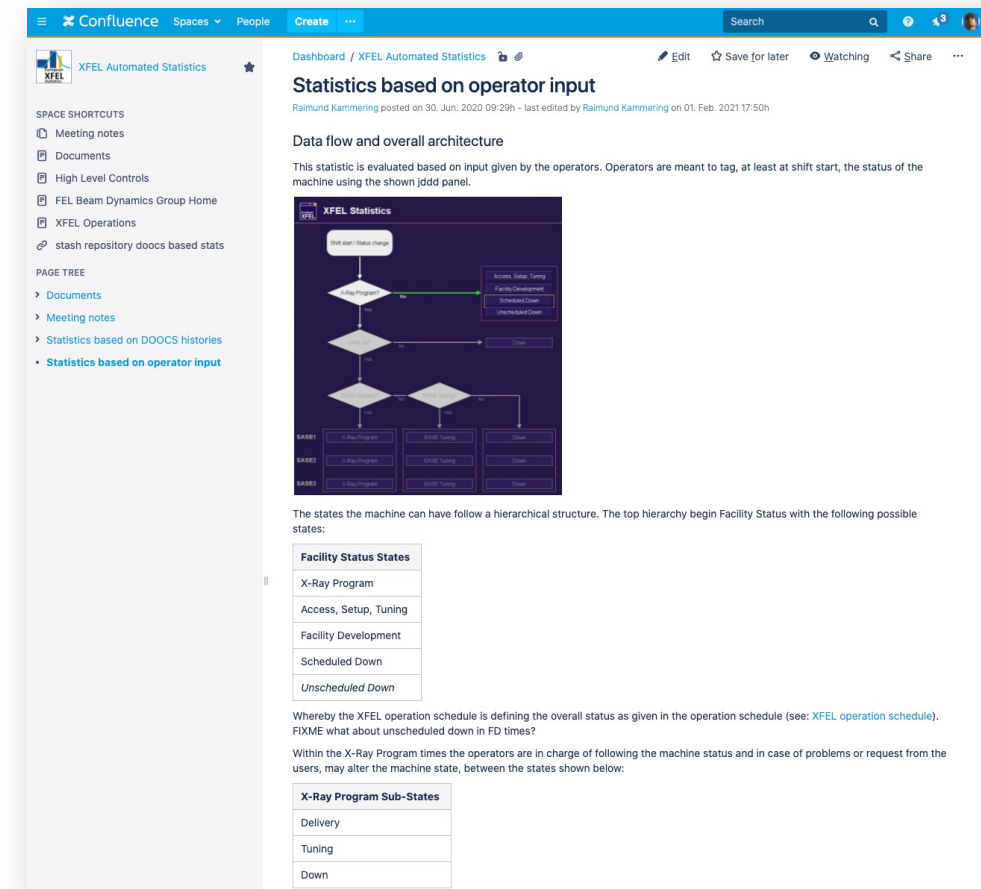
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The modern days

Operators: *Now it's your job*

Facility Status States automatically derived from Facility schedule				
X-Ray Program	Access, Setup, Tuning	Facility Development	Scheduled Down	Unscheduled Down

X-Ray Delivery Sub-States *"always two there are"* ;) no kidding: 3 possibilities		
Delivery	Tuning	Down

Tuning Categories please select one!					
not_set	Wavelength_change	Quality	Pointing	Pulse_energy	Special_mode

| **Down Categories** this can be the tricky part								
not_set	Beam distribution or dumps	Controls	Coupler Interlocks	Cryogenics	Diagnostics	Experiments	Gun	HPRF
Infrastructure	Laser	LLRF	Magnets	MPS or EPS	Operation	Undulator	Vacuum	Scheduled maintenance

What it's used for

Reports and the Statistics Dashboard

Reports

- hmmm - did not find it in the XFEL MAC reports

- FLASH uses this as main figure of merit in terms of availability to be presented in MAC and Betriebsseminar

Dashboard

- At least here it is used in the weekly summary

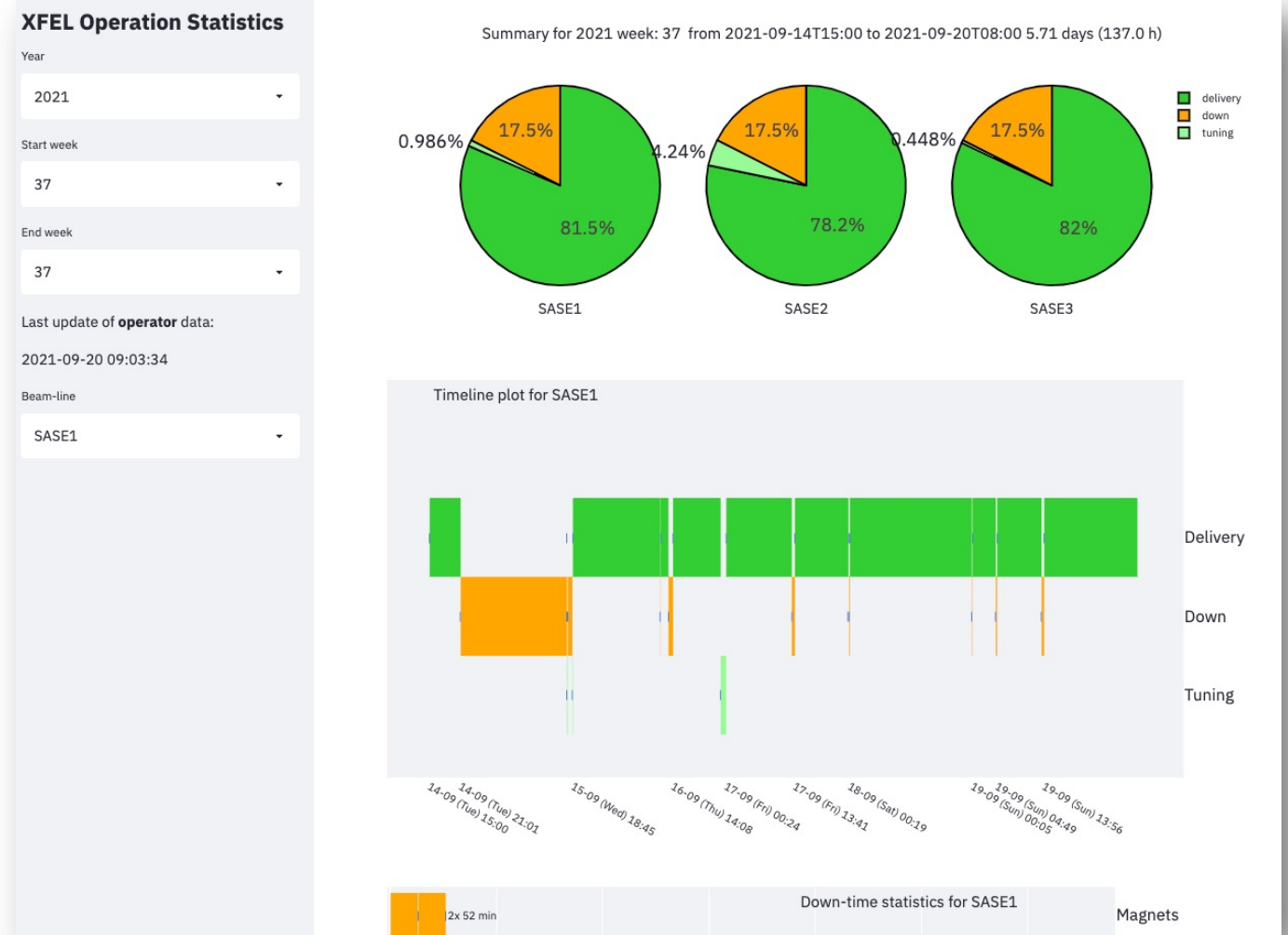- Used Excel download to compare with N. Walker for Linac RF downtimes
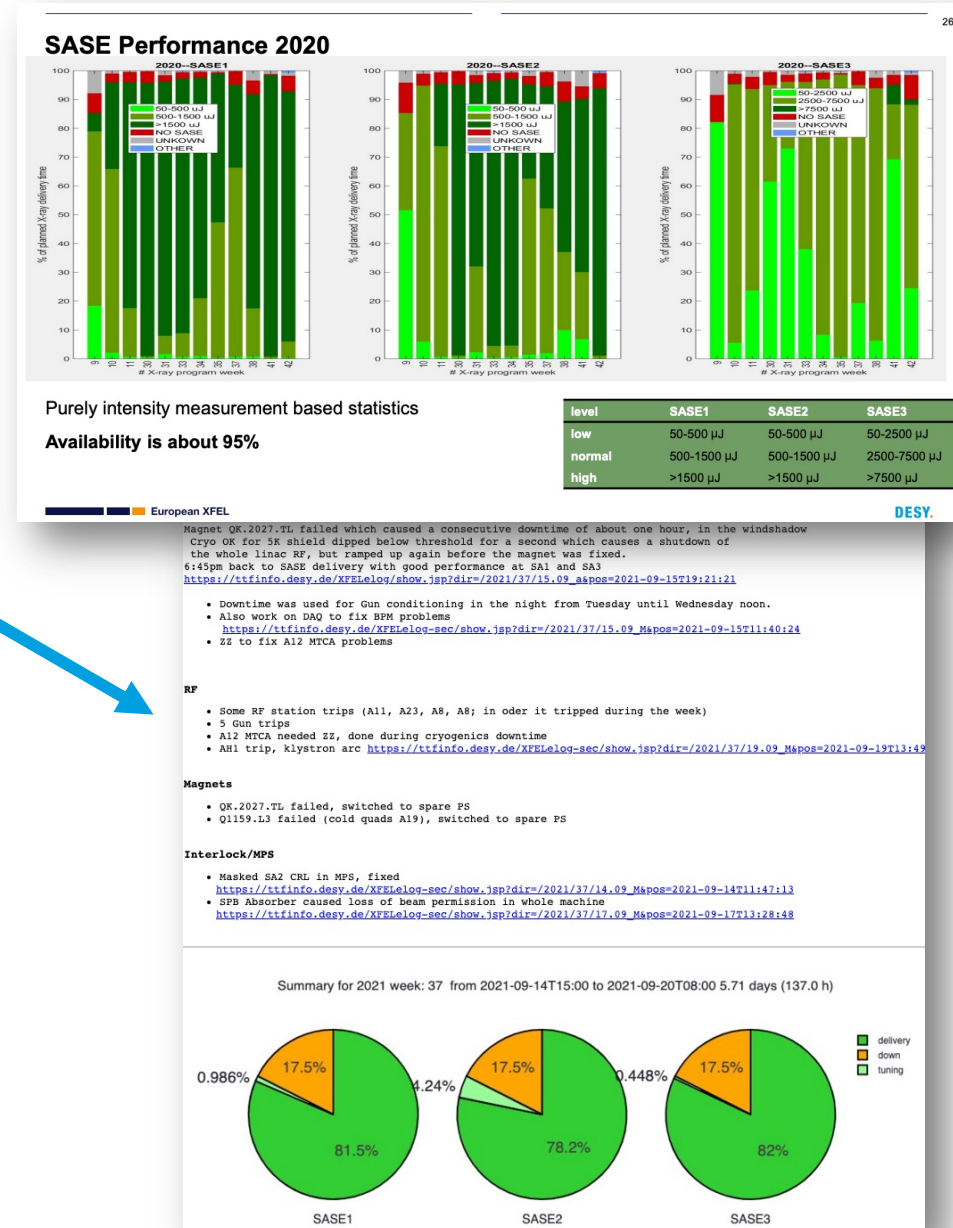
What it's used for

Reports and the Statistics Dashboard

The Dashboard

- Let's have a look in real live:

https://flashwebsvr3.desy.de/XFEL-Statistics/

What's missing

Other statistics

There is a completely different approach using purely XGM intensity based data

- Developed by Elena Castro using Matlab

- took some time to get into agreement with operator based statistics, but now it's quite fine

- offers much **deeper insides** into **SASE performance**, but …

- here **no details about down and tuning times**

- well documented in confluence:

https://confluence.desy.de/display/XAS/Statistics+based+on+DOOCS+histories

What's missing

Shortcomings and a look to the future

Just last week question came up

- "Are we less suffering from power glitches/cuts?"

- Browsed through downtimes looking for

  - Infrastructure

  - merged with 'Netzwischer' statistics from MKK

  - tried to match timestamp of 'Netzwischer' with down (any category)

- This failed completely for 2019, 2020 partly okay for 2021

- Reason - just one example:

  - 'Netzwischer' on Monday, recovery took 20 h, still not 'leaking' into x-ray delivery time → not traceable with this approach!

	A	B	
138	2019-06-22 05:58:00	powerglitch	
139	2019-06-30 13:52:00	powerglitch	
140	2019-07-08 06:09:00	powerglitch	
145	2019-07-17 10:40:07	not_set	A16 trip, due to quench !
150	2019-07-18 15:55:00	not_set	
152	2019-07-20 18:53:00	powerglitch	
154	2019-07-22 06:25:00	not_set	
155	2019-07-23 15:00:00	not_set	
158	2019-07-24 16:48:46	not_set	gun tripped
160	2019-07-25 16:31:02	not_set	A17 tripped
161	2019-07-26 09:07:57	not_set	
163	2019-07-27 03:04:36	not_set	
164	2019-07-27 08:19:49	not_set	
165	2019-07-27 14:41:12	not_set	
176	2019-07-29 03:05:32	not_set	
177	2019-07-29 03:09:29	not_set	A4 quenched. FSM gave up after quenches
178	2019-07-29 03:59:59	not_set	
179	2019-08-02 05:19:00	powerglitch	
180	2019-08-02 06:24:00	powerglitch	
181	2019-08-03 05:14:00	powerglitch	
182	2019-08-06 15:23:10	not_set	
183	2019-08-06 17:28:16	not_set	
184	2019-08-06 18:12:09	not_set	
185	2019-08-06 18:24:26	not_set	
186	2019-08-07 12:32:50	not_set	
187	2019-08-07 15:00:00	Infrastructure	
188	2019-08-08 03:05:49	not_set	
189	2019-08-08 04:41:32	not_set	
190	2019-08-09 04:52:41	not_set	
199	2019-08-13 12:17:00	powerglitch	
200	2019-08-13 23:00:00	not_set	
203	2019-08-16 17:46:39	not_set	
204	2019-08-17 08:43:02	not_set	
205	2019-08-17 10:37:00	powerglitch	

Thank you for your attention!

Questions/Comments?